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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/118,833	07/20/1998	TOSHIRO NISHI	0965-0232P-S	9403

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EXAMINER
CREPEAU, JONATHAN

ART UNIT	PAPER NUMBER
1745	24

DATE MAILED: 07/16/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

MF=24

Office Action Summary	Application No.	Applicant(s)	
	09/118,833	NISHI ET AL.	
	Examiner	Art Unit	
	Jonathan S. Crepeau	1745	

-- Th MAILING DATE of this communication appears on the cover she t with th correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 April 2002* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *4-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *4-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Amendment

1. This Office action addresses claims 4-20 and newly added claims 21-28. Claims 4-20 remain rejected under 35 USC §103 for substantially the reasons of record, and claims 21-28 are newly rejected under 35 USC §103, as necessitated by amendment. Accordingly, this action is made final.

Claim Rejections - 35 USC § 103

2. Claims 4-11 and 24-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Soma et al (U.S. Pat. 5,411,767). Regarding claims 4, 10, and 28, Soma et al teach a solid electrolyte type fuel battery having an interconnector comprising a material having the formula ABO_3, wherein A is preferably Ca, Ba, or Sr, and B is preferably Ti (see column 5, lines 13-38). Regarding claims 6 and 8, in column 4, line 40 through column 5, line 12, a formula of $(La_{1-x}D_x)_{1-u}B_{1-w}O_3$ is taught, where D can be Ca, Sr, Ba, or nothing (when x = 0), and B can be Ti (+Mg, +Nb). Soma et al. also teach the other elements of the fuel cell, e.g., the fuel electrode, air electrode, electrolyte, and substrate, in Figure 1. As disclosed in column 2, lines 47-58, the interconnector is formed by plasma spraying followed by heat treatment (i.e., sintering). Regarding claims 24-27, the relative density of the interconnector may be 95% or greater (see col. 9, line 61).

The reference does not expressly teach that the battery is co-sintered or that the interconnector is integrally burned within the battery, or that the current passage of the

interconnector is current collection in the vertical direction (claims 5, 7, 9). The reference further does not teach the same subscript ranges for the $(La_{1-x}D_x)_{1-u}B_{1-w}O_3$ compounds as recited in instant claims 6 or 8.

However, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the artisan would be motivated to use a vertical direction of current collection in the fuel cells of Soma et al. The direction of current collection is dependent upon the orientation of the fuel cells, which depends on the particular application the fuel cells are used in. For example, in a large array where the terminals are located at the top or bottom of the apparatus, the interconnectors would either be located at the top or bottom of the fuel cells, thus resulting in current collection in the "vertical" direction.

Regarding the subscript ranges recited in claims 6 and 8, the claimed materials and prior art materials have substantially identical elemental compositions, and therefore could reasonably be expected to have similar properties. As such, the artisan may manipulate these subscript ranges so as to vary the necessary amounts of reagents, and thus optimize the production costs of the materials. Applicant must show that the particular subscript ranges are critical, generally by showing that the claimed ranges achieve unexpected results relative to the prior art ranges (*In re Woodruff*, 16 USPQ2d 1934).

Additionally, regarding the "co-sintered" and "integrally burned" limitations in the claims, these limitations are not considered to patentably distinguish over the Soma reference. These limitations are essentially process limitations, and therefore allow the claims to be interpreted as product-by-process claims. As noted above, the interconnector of Soma appears to be "sintered." As set forth in MPEP §2113, once the examiner provides a rationale tending to show that the

claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. *In re Marosi*, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983).

3. Claims 4-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 8-50913 in view of Soma et al.

Regarding claims 4, 6, 8, 10, 12, 14, 16, and 28, in the abstract, JP 8-50913 teaches a method of making a solid oxide fuel cell comprising the step of integrally sintering (burning) an air electrode (23) and an interconnector (24), which together comprise a support tube (22). Regarding claims 11, 13, 15, and 17, the fuel cell further comprises a fuel electrode (26) and an electrolyte (25). As shown in Figures 1 and 2, the interconnector is located at the top of the tube, thus providing for current collection in the "vertical" direction (claims 5, 7, 9, 18-20).

The Japanese reference does not expressly teach the material(s) which may comprise the interconnector, or the temperature at which the sintering is performed (claims 21-23).

As set forth in section 2 above, Soma et al. teach interconnectors having relative densities of at least 95% and which comprise perovskite materials that are not patentably distinct from the instantly claimed materials. In column 3, line 23, Soma et al. describe these materials as being "suitable for [an] interconnector." In Table 1, Soma et al. disclose that the interconnectors are heat treated at a temperature of 1400°C.

Therefore, the invention as a whole would have been obvious to one of ordinary skill in the art at the time the invention was made because the courts have held that the selection of a known material based on its suitability for its intended use is *prima facie* obvious (MPEP §2144.07). Accordingly, the artisan would be motivated to use the species disclosed by Soma in the interconnector of the Japanese reference. Furthermore, the artisan would be motivated to use a sintering temperature of 1400°C in the manufacturing process of JP '913. In column 6, lines 44-49, Soma et al. teach that a heat treatment temperature of at least 1250°C for these materials is "preferabl[e]." Therefore, the artisan would be motivated to perform the sintering step of JP '913 at a temperature of 1400°C.

Additionally, the recitation in instant claims 13, 15, and 17 that the electrodes, electrolyte, and interconnector are "laminated onto a substrate" is not seen to distinguish over the Japanese reference. As noted above, the reference identifies the combination of the air electrode and interconnector as a "support tube" (22), which itself functions as a substrate. Accordingly, it is seen that the "substrate" defined by the instant claims is integrally present in the fuel cell structure of the reference. Furthermore, it is noted that Soma et al. contemplate the interchangeability of a "true" substrate (3) and an "air electrode" substrate (13) in Figures 1 and 2 and in column 7, lines 3-10.

Response to Arguments

4. Applicant's arguments filed April 11, 2002 have been fully considered but they are not persuasive. Applicants first assert that Soma fails to teach a sintered interconnector. However, as noted in section 2 above, Soma teaches a heat treatment step that appears to perform a

sintering function. According to *Merriam-Webster's Collegiate Dictionary*, to "sinter" is to "cause to become a coherent mass by heating without melting." As taught in column 2, line 47 et seq. of Soma, the heat treatment causes the crystalline phases to be come a homogeneous single phase so that the film is microstructurally homogenized. Accordingly, it is believed that the interconnector of Soma et al. is in fact "sintered." Furthermore, despite Applicant's assertions, the alleged structural differences between the fuel cell produced by the method of Soma et al. and the fuel cell produced according to the methods recited in claims 4-11 and 28 are still not readily apparent.

Applicants further assert that the claimed "vertical current collection" yields advantages that are neither taught nor suggested by the Soma reference. However, it is the Examiner's position that these advantages are achieved by using a specific fuel cell structure, which is shown in Fig. 44(a) of the application. Therefore, any such advantages are not believed to be commensurate with claims 5, 7, and 9 because the structure which produces the advantages is not claimed. Furthermore, the advantages are not presented in the form of evidence (e.g., results or data) that could be viewed as being unexpected. It is suggested that the structure of the fuel cell be more precisely claimed. However, an amendment filed after final rejection effecting such changes may be considered to raise new issues and may therefore be denied entry.

Applicants further assert that the $A_{1-x}B_xC_{1-y}D_yO_3$ formula of claims 6 and 8 has criticality when x is 0.2. Figure 30 of the application is cited as supporting this position. However, it is believed that this graph is not sufficient to establish criticality of the subscript x=0.2. It is noted that the relative density decreases by less than 2% for both materials when x is increased from 0.2 to 0.3. Furthermore the relative densities when x=0.3 are still greater than 94%. As

evidenced by the inclusion of this range into the claims, 94% is considered to be a good relative density. Therefore, it is believed that Applicants have not shown criticality of the x=0.2 (i.e., $Sr_{0.8}La_{0.2}$) limitation. It is noted that Soma teaches an $Sr_{0.09}La_{0.2}$ composition in col. 4, line 44 (when x=0.3 and u=0.71). A comparison of the claimed composition with the composition of Soma may be helpful in distinguishing the claimed composition.

Regarding new claim 28, Applicants assert that the number of permutations of the formula ABO_3 is "fantastically high." However, it is believed that Soma provides sufficient motivation to select Ca, Sr, or Ba as the "A" element and Ti as the "B" element. In column 5, lines 28 and 36, Soma teaches that these elements are "particularly preferable" and "more preferable," respectively. Therefore, Soma provides motivation to select these elements so as to produce the claimed composition. It is respectfully submitted that given Soma's teachings, there would not be an undue burden on the artisan to select the claimed elements. See *In re Baird*, 29 USPQ2d 1550 (Fed. Cir. 1994).

Finally, Applicants assert that the declaration under 37 CFR §1.132 filed February 12, 2001, rebuts the *prima facie* case of obviousness over Soma et al. However, the Examiner maintains that this declaration is insufficient to rebut the *prima facie* case for the reasons set forth in section 4 of the previous Office action (paper no. 21).

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Crepeau whose telephone number is (703) 305-0051. The examiner can normally be reached Monday-Friday from 9:30 AM - 6:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan, can be reached at (703) 308-2383. The phone number for the organization where this application or proceeding is assigned is (703) 305-5900. Additionally, documents may be faxed to (703) 305-5408 or (703) 305-5433.

Any inquiry of general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Patrick Ryan
Supervisory Patent Examiner
Technology Center 1700

JSC

July 13, 2002